Development of the *2015-2016 ARFVTP Investment Plan Update*

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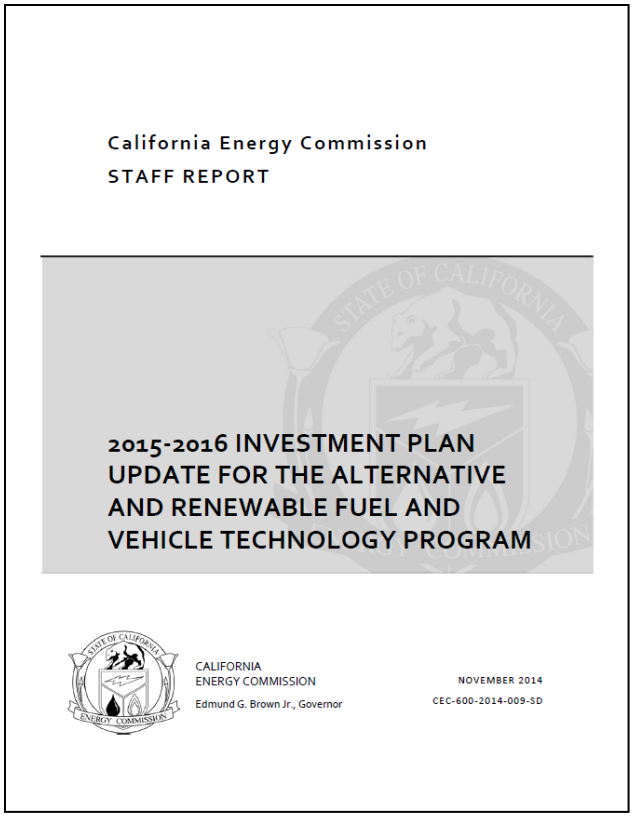
Purpose

- Basis for FY 2015-2016 solicitations, agreements and other funding opportunities
- $100 million funding allocation for a portfolio of fuels, technologies, and supporting elements
- Funding allocations for categories (not individual projects)



Schedule

Activity	Date
Release Staff Draft	November 5, 2014
First Advisory Committee Meeting	November 12, 2014
Release Revised Staff Draft	By January 10, 2015
Second Advisory Committee Meeting	Late January 2015
Release Lead Commissioner Report	March 2015
Business Meeting Approval	April 2015

New Considerations for *2015-2016*

- Low-Carbon Transportation projects from new Greenhouse Gas Reduction Fund (GGRF)
- Continued growth of PEVs
- First AB 8 report on hydrogen stations and fuel cell vehicles
- Proposed integration of MD-HD Vehicle Demonstration and Manufacturing funds
- LCFS re-adoption and updates

Structure of the *2015-2016 Investment Plan Update*

- Alternative Fuel Production and Supply
- Alternative Fuel Infrastructure
- Alternative Fuel and Advanced Technology Vehicles
- Related Needs and Opportunities
- Summary

Biofuel Production and Supply

Opportunities exist for ARFVTP to expand high-volume, low-carbon biofuel production within CA

ARFVTP Investments in Commercial-Scale Biofuel Production Projects (to Date)

Fuel Type	Pathway Description	Average GHG Emission Reduction	# of Projects	Range of Annual Capacity for Individual Projects (DGE or GGE)	Total Annual Capacity Increase
Biomethane	Food, green, yard, and mixed municipal waste	110%	6	570,000 – 2,870,000	9.8 Million DGE Per Year
Diesel Substitutes	Waste oils (various)	81%	9	4,600,000 – 7,500,000	53.2 Million DGE Per Year
Gasoline Substitutes	Grain sorghum	31%	3	2,600,000 – 3,000,000	9.6 Million GGE Per Year

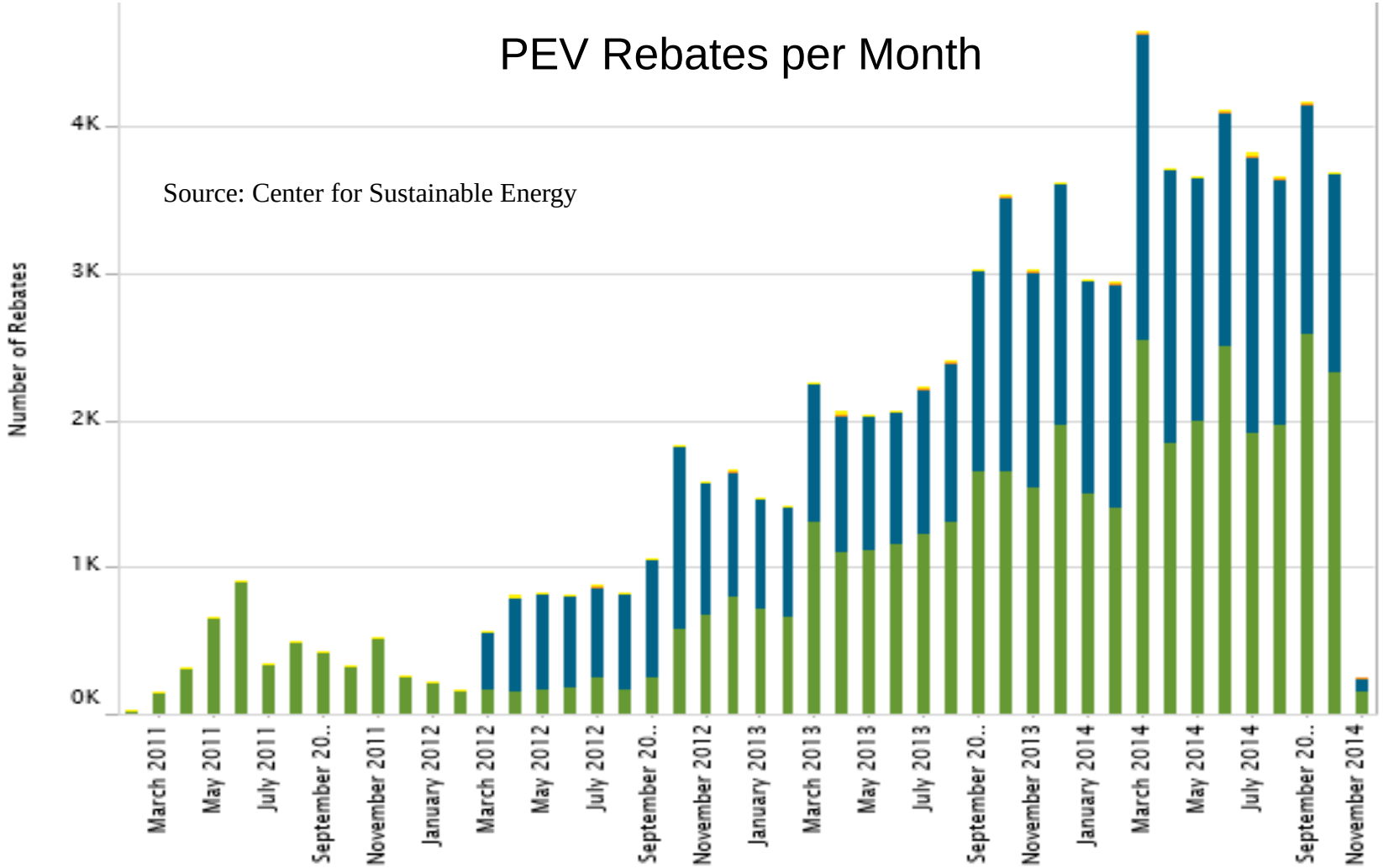
Biofuel Production and Supply

- Challenges
  - ARFVTP investments in increased capacity are not enough to meet 2020 GHG goals (let alone 2050)
  - Need other mechanisms as well (LCFS, AB 32, RFS)
  - Need to address broader market transformation, both within biofuels and other fuels / technologies
- Opportunities with drop-in fuels
  - Eliminates restrictions from blending limits (E10, B5, etc.)
  - Renewable diesel is increasingly prevalent in ARFVTP proposals, and growing in biofuel imports too
  - Renewable gasoline further behind

Biofuel Production and Supply

- Proposed allocation of $20 million
  - Covers multiple fuel types, and multiple phases of technological maturation
  - ARFVTP may consider requiring higher levels of benefit per dollar for future awards, or targeting more advanced fuel conversion pathways or feedstocks
  - Policy Goals Supported:
    - GHG Reduction
    - Petroleum Reduction
    - In-State Biofuels Production
    - Low Carbon Fuel Standard

Electric Charging Infrastructure



Benchmarks Toward 2020 ZEV Action Plan Goal

Scenario		Public and Private Level 2	Estimated ARFVTP Cost ($ millions)	Public Fast Chargers	Estimated ARFVTP Cost ($ millions)
Additional Charging Needed (Compared to August 2014)	**2017**				
	Home-Dominant	13,659	$20.5	-	-
	High Public Access	32,429	$48.6	289	$4.3
	2018				
	Home-Dominant	17,805	$26.7	18	$0.3
	High Public Access	40,239	$60.4	364	$5.5

- Level 2 units include public chargers, private workplace chargers, and private fleet chargers, but not private residential units.
- Not all units will necessarily require ARFVTP support.

Source: NREL analysis, derived from *California Statewide Plug-in Electric Vehicle Infrastructure Assessment*.

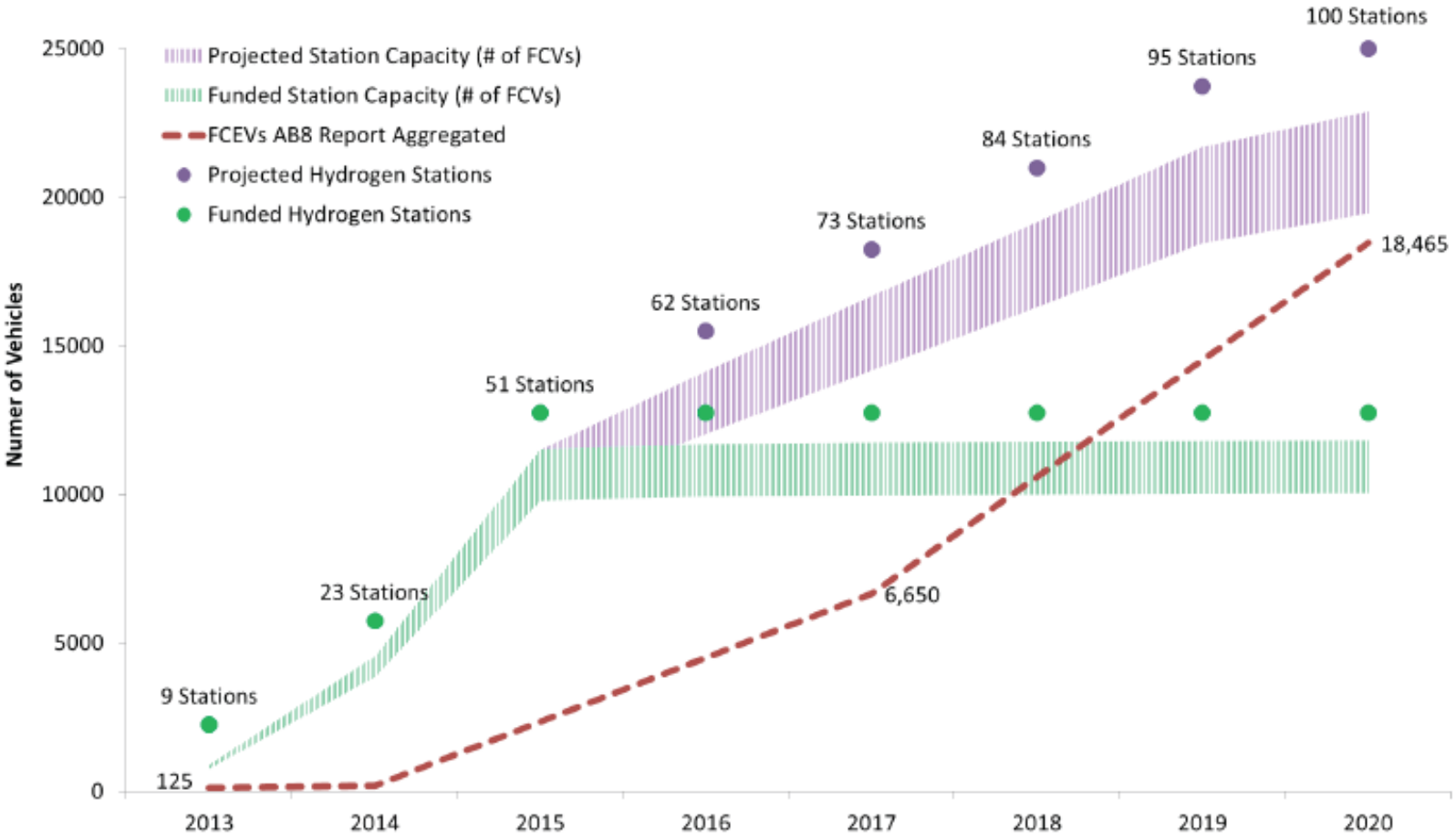
Electric Charging Infrastructure

- Need to keep pace with continued PEV growth
- Potential financing project with CPCFA
- Proposed $18 million allocation
  - Key charging types for ARFVTP incentives
    - Multi-unit dwelling
    - DC fast charger
    - Workplace
    - Geographically underserved or disadvantaged
  - Policy Goals Supported
    - GHG Reduction
    - Petroleum Reduction
    - Low Carbon Fuel Standard
    - Air Quality
    - ZEV Mandate

Hydrogen Refueling Infrastructure

- ARB's *Annual Evaluation* Under AB 8
  - June 2014: *Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development*
  - Evaluates need for additional publicly available hydrogen fueling stations for next 3 years
  - Evaluation based on DMV data, automaker projections, targeted geographic areas, and station coverage
  - 68 stations needed to support initial FCEV launches; 100 stations needed to transition toward market-driven industry

Projected Growth of FCEVs and Stations



Source: ARB, *Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development,* June 2014

Annual Evaluation Working Recommendations on Station Funding

Location	Purpose	Suggested Station Counts
Berkeley Cluster	Establish Market	2
South San Francisco/Bay Area Cluster	Coverage/Capacity	1
Coastal/South Orange County Cluster	Coverage/Capacity	1
West Los Angeles/Santa Monica Cluster	Coverage/Capacity	1
Torrance Cluster	Coverage/Capacity	2
San Diego Area	Coverage	1
Sacramento Area	Coverage	1
Expanded Network Areas	Coverage or Destination/Connector	1 or 2
	Total	**10-11**

Source: Ibid.

Hydrogen Refueling Infrastructure

- Energy Commission dedicates $20M, as needed, for refueling stations as identified in Annual Evaluation
- O&M also needed to enable the business case of station developers
  - $300,000 for three years offered in last PON
- Proposed $20 million allocation
  - Could support 6-9 new stations, plus O&M needs
- Policy Goals Supported
  - GHG Reduction
  - Petroleum Reduction
  - Low Carbon Fuel Standard
  - Air Quality
  - ZEV Mandate

Natural Gas Fueling Infrastructure

- Most non-public fleets can access capital for refueling station installation and operation
- ARFVTP priority: school district and municipal fleet stations

Most recent ARFVTP solicitation

Applicant Type	Projects Awarded Among Qualifying Proposals*	ARFVTP Funding (in millions)
School District	6 out of 6	$1.8
Municipality	4 out of 4	$1.2
Fuel Vendor	2 out of 2	$0.4
Municipal Solid Waste	5 out of 7	$2.0
Utility	1 out of 3	$0.3
Transit	0 out of 1	-
Towing	0 out of 1	-
Air District / Joint Power Authority	0 out of 2	-
Total	**18 out of 26**	**$5.7**

Natural Gas Fueling Infrastructure

- NREL analysis: NG fueling stations accounted for large share of near-term GHG reduction
- Compared to NG vehicle incentives, NG station incentives offer an easier opportunity to incorporate biomethane
  - 5 ARFVTP-funded stations using biomethane so far
- Proposed $5 million allocation
- Policy Goals Supported
  - Petroleum Reduction
  - Air Quality
  - Low Carbon Fuel Standard
  - GHG Reduction (with incorporation of biomethane)

Medium- and Heavy-Duty Vehicle Technology Demonstration and Scale-Up

Source: Oak Ridge National Laboratory
2013 Vehicle Technologies Market Report

Class 3-8 GVW (10,001+ lbs)

- ***3 percent*** (936,000) of all registered CA vehicles
- ***30 percent*** of all on-road GHG emissions
- Great opportunity for big GHG emission reductions from small number of vehicles
- Each vehicle application is unique, and solutions must be appropriately matched

ARFVTP Investments in Demonstrating MD-HD Vehicle Technologies

Vehicle/Technology Type	# of Projects	# of Units	ARFVTP Funding to Date (in millions)
Medium-Duty Hybrids, PHEVs and BEVs	8	164	$15.8
Heavy-Duty Hybrids, PHEVs and BEVs	6	14	$11.3
Electric Buses	4	17	$6.3
Natural Gas Trucks	4	5	$8.3
Fuel Cell Trucks and Buses	3	6	$4.5
Vehicle-to-Grid	3	TBD	$5.3
Off-Road Hybrids	2	2	$4.5
E85 Hybrids	1	1	$2.7
Total	**31**	**209+**	**$58.7**

Medium- and Heavy-Duty Vehicle Technology Demonstration and Scale-Up

- Coordination with GGRF, HVIP
  - ARFVTP needed to support small-scale demonstrations
  - Two GGRF-funded categories for larger-scale demonstration and pilot projects
  - HVIP will continue to provide deployment incentives
- Merging of Manufacturing funds
  - Companies need opportunity to build on successful demonstrations; otherwise, no way to advance
  - Simplify ARFVTP support with one allocation
  - Proposed allocation of $20 million
- Policy Goals Supported
  - GHG Reduction
  - Air Quality
  - Petroleum Reduction
  - Low Carbon Fuel Standard

Natural Gas Vehicles

- GHG reduction from NG under LCFS
  - Currently, 10-25% below gasoline or diesel, depending on fuel and vehicle type
  - Proposed updates to CA-GREET may increase life-cycle GHG emissions of NG, due to methane leakage
  - Research and analysis ongoing
- Criteria pollution reduction from NG
  - Development of low-NOx engines underway
  - May offer an opportunity for NOx emissions 90 percent below the current standard (0.02 g/bhp-hr)

Natural Gas Vehicles

- Technological and market maturity
  - Cheaper fuel than gasoline or diesel
  - Easier to adopt than other advanced technologies
  - 15,000 medium- and heavy-duty NG trucks in CA (<2%)
- Long-term ARFVTP expectations
  - Reduce traditional incentive amounts
  - Focus on new technologies (hybrid or low-NOx engines)
  - Focus on disadvantaged communities
- Proposed $10 million allocation
- Policy Goals Supported
  - Petroleum Reduction
  - Air Quality
  - Low Carbon Fuel Standard
  - GHG Reduction (with incorporation of biomethane)

Light-Duty Electric Vehicles

- GGRF support
  - $111 million toward CVRP in FY 2014-2015
  - Allocations in future will likely be determined annually
- SB 1275 (Charge Ahead California Initiative)
  - Requires ARB to revise incentives for income eligibility, phase down incentives over time based on sales, and consider other incentive methods
- With anticipated GGRF support, no proposed ARFVTP allocation

Related Needs and Opportunities

- Emerging Opportunities
  - Only $0.9 million of previous year's allocation needed to fully fund previous solicitation; $5.1 million remaining
  - Proposed $4 million allocation
- Workforce Training and Development
  - Continue with existing partner agencies
  - Proposed $3 million allocation based on expectations of needed funds
- Regional Readiness
  - No proposed allocation, but may reconsider based on current solicitation
- Policy Goals Supported
  - GHG Reduction

Next Steps for *2015-2016 Investment Plan Update*

- Seeking feedback from all stakeholders
  - Comments requested by November 21, 2014
  - E-mail: docket@energy.ca.gov, Subject: 14-ALT-01
- Continued review of existing ARFVTP investments, as well as related programs and policies
- Release Revised Staff Draft by January 10, 2015
- 2nd Advisory Committee meeting in late January 2015

Proposed Funding Allocations

Category	Funded Activity	Proposed Funding Allocation
Alternative Fuel Production	Biofuel Production and Supply	$20 Million
Alternative Fuel Infrastructure	Electric Charging Infrastructure	$18 Million
	Hydrogen Refueling Infrastructure	$20 Million
	Natural Gas Fueling Infrastructure	$5 Million
Alternative Fuel and Advanced Technology Vehicles	Natural Gas Vehicle Incentives	$10 Million
	Medium- and Heavy-Duty Advanced Vehicle Technology Demonstration and Scale-Up	$20 Million
Related Needs and Opportunities	Manufacturing	
	Emerging Opportunities	$4 Million
	Workforce Training and Development	$3 Million
	Total Available	**$100 Million**

Backup Slides

Three Most Recent Allocations

Category	Funded Activity	2013-2014	2014-2015	2015-2016 (Proposed)
Alternative Fuel Production	Biofuel Production and Supply	$23	$20	$20
Alternative Fuel Infrastructure	Electric Charging Infrastructure	$7	$15	$18
	Hydrogen Refueling Infrastructure	$20	$20	$20
	Natural Gas Fueling Infrastructure	$1.5	$1.5	$5
Alternative Fuel and Advanced Technology Vehicles	Natural Gas Vehicle Incentives	$12	$10	$10
	Light-Duty Electric Vehicle Deployment	$5	$5	-
	Medium- and Heavy-Duty Vehicle Technology Demonstration and Scale-Up	$15	$15	$20
	Manufacturing	$5	$5	
Related Needs and Opportunities	Emerging Opportunities	$4	$6	$4
	Workforce Training and Development Agreements	$2	$2.5	$3
	Regional Alternative Fuel Readiness and Planning	$3.5	-	-
	Centers for Alternative Fuels and Advanced Vehicle Technology	$2	-	-
Total		**$100**	**$100**	**$100**